SEVIRI HRV Fog RGB
Quick Guide

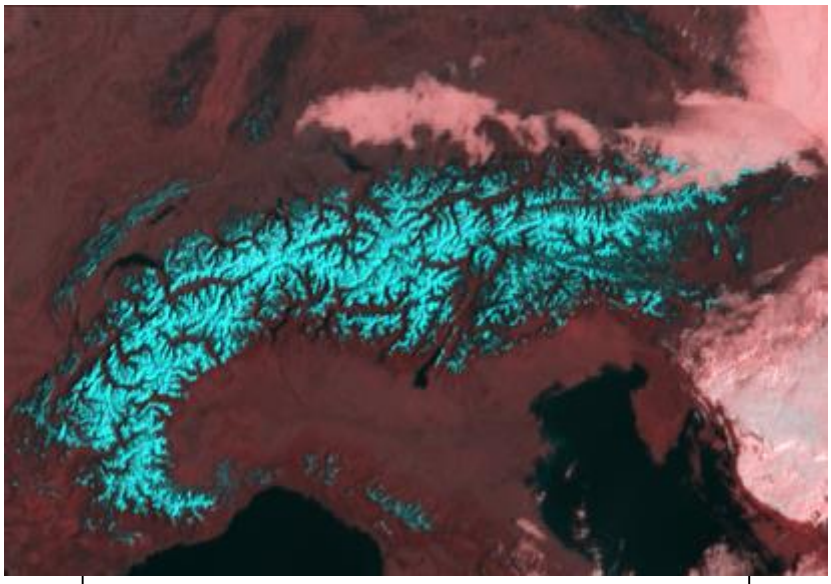
Aim: Discrimination of fog/low clouds from snow covered land in high resolution.

Area and time period of its main application: Mid-latitude region, daytimes at winter.

Application and guidelines: The identification of foggy and low cloud covered areas is important for traffic and aviation security. Wintertime fog/stratus frequently forms over snowy cloud-free surfaces in high pressure conditions.

Fog/water clouds have good colour contrast against snow and snow-free land.

This is a daytime RGB as it uses shortwave channels.



SEVIRI HRV Fog RGB for 7 March 2014 at 08:40 UTC

Background

The table shows which channels are used in the HRV Fog RGB and lists some of the land and cloud features which have typically low or high contribution to the colour beams in this RGB. Snow's reflectivity is much higher in HRV than in NIR1.6. As water clouds reflect much of the radiation in both channels they can be used in combination to distinguish snow and water clouds.

Colour	Channel [µm]	Physically relates to	Small contribution to the signal of	Large contribution to the signal of
Red	**NIR1.6**	Cloud phase Snow reflectivity	Ice cloud **Snow covered land**	**Water clouds**
Green	**HRV**	Cloud optical thickness Snow reflectivity	Thin clouds	**Thick clouds** **Snow covered land**
Blue	**HRV**	Cloud optical thickness Snow refllectivity	Thin clouds	**Thick clouds** **Snow covered land**

Notation: HRV: High Resolution Visible channel, NIR: near-infrared, number: central wavelength of the channel in micrometer.
HRV is used in two colour beams not too lose the high resolution.

Benefits

- Detection of the cloud phase: ice and water clouds appear in different colours (most of the cases → see limitations).
- Detection of snow: snow covered land and snow free land have different colours.
- Fog and water cloud have good colour contrast both against snow covered and snow free land.
- High resolution:
  - Smaller patches of snow, fog or low clouds are recognisable.
  - The structure of the land and cloud features are better seen.
- This RGB is easy to understand, it has nice colours. It is relatively good for public.

Limitations

- It works only during daytime. For night time the night RGB can be used.
- In twilight condition the colour contrast may get lower.
- Snow/fog/low cloud is not seen under higher level thick clouds.
- Fog and low clouds are not separable based on their colours. Studying the form, structure, movement may help.
- The colours of snow and ice clouds are similar. (Ice cloud may have some more grey shades.) It is not easy to distinguish them. Studying their form, structure, movement may help.
- This RGB type combines only two channels, thus two types of information. It does not contain e.g. temperature information.
- The separation between ice and water clouds is not perfect. Water clouds with large droplets can have similar colours as ice clouds; ice clouds with small ice crystals can have similar colours as water clouds.

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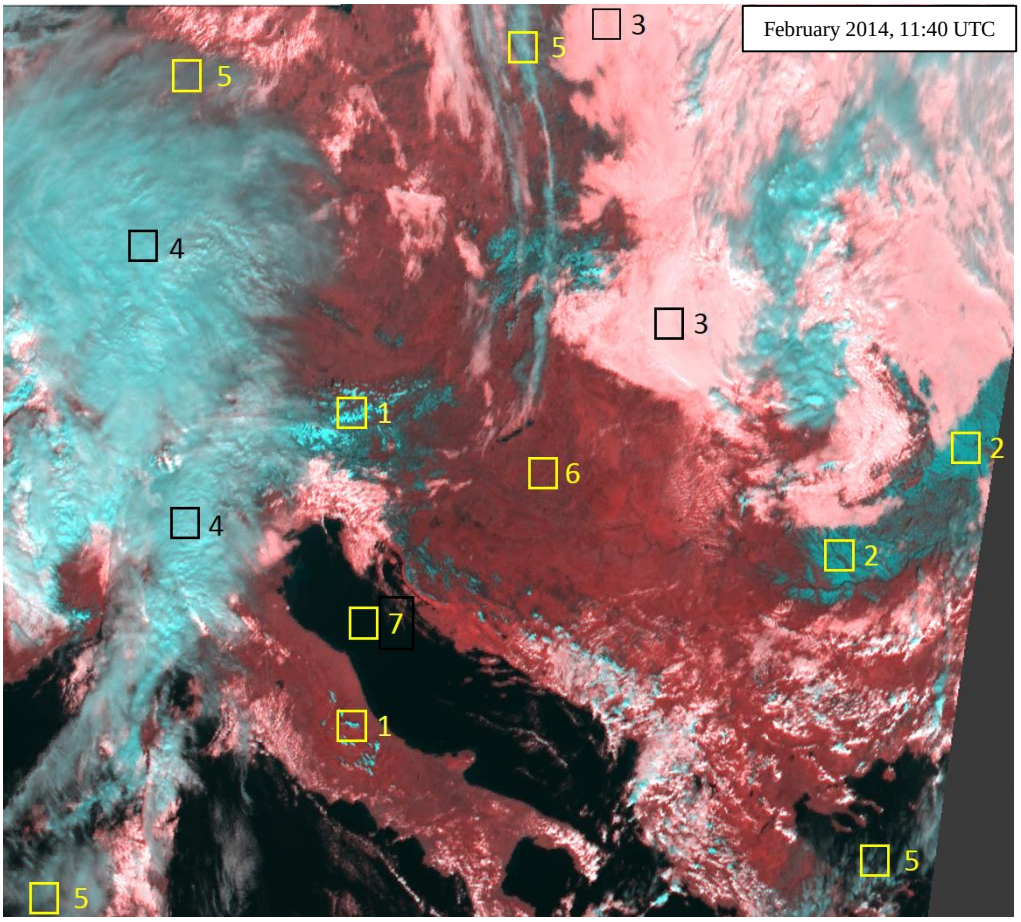
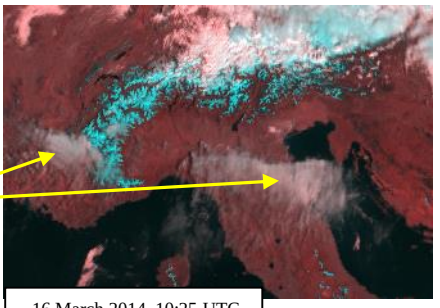
Interpretation

1	Snow covered high mountains (Shades of bright cyan)
2	Snow covered lowland (Shades of greyish cyan with patches, lines)
3	Fog or water cloud (Shades of pink, in case of very large droplets, it may have some cyan tones)
4	Thick ice cloud (Shades of greyish cyan, in case of small ice crystals, it may have some pinkish-greyish tones)
5	Thin ice cloud (Shades of cyan depending on the transparency and the type of the underlying surface; in case of small ice crystals it may have pinkish tones)
6	Snow-free land (Shades of reddish brown)
7	Ice-free sea (Shades of black)

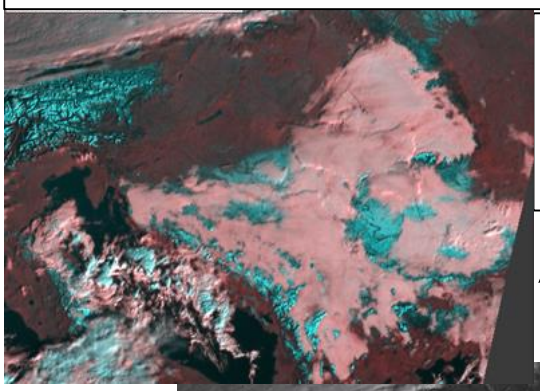


Colours depend on the solar and satellite viewing angles, on the quality of the snow and on the fact whether the area is totally covered by snow. Snow on high mountains usually has a brighter colour than on hills or lowlands, as the snow cover is less disrupted by vegetation.
The colour of a cloud slightly depend on the size of the cloud top particles as well. Water clouds with large droplets may appear slightly cyan. Ice clouds with extreme small crystals may appear pinkish-whitish, like the high-level lee clouds in the image on the right (indicated by arrows).

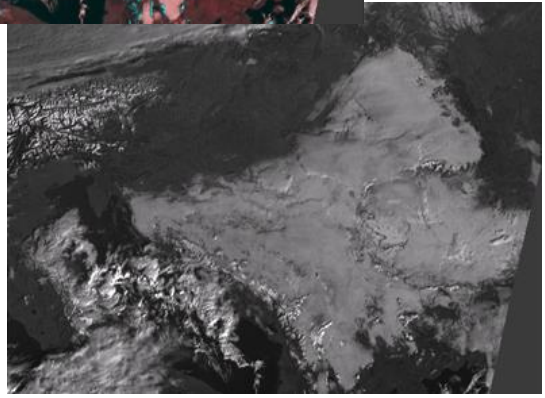


16 March 2014, 10:25 UTC

Comparison to other products



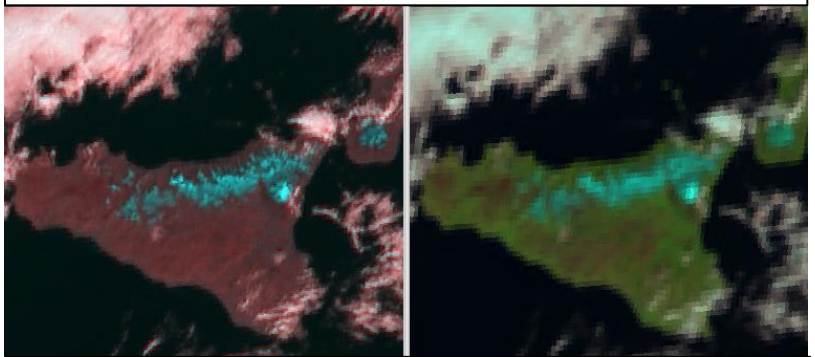
In the HRV Fog RGB image (left) one can distinguish snow from fog or water clouds much easier than in HRV image (bottom).



HRV Fog RGB (up) and HRV (bottom) for 28 November 2013, 07:40 UTC

Useful links:
MSG Interpretation Guide
EUMeTrain Training Module
RGB Colour Interpretation Guide
NASA SPORT COMET module

Natural Colour RGB (right) also detects snow and fog/water clouds in different colours and it provides vegetation information as well, but it has lower spatial resolution.



HRV Fog RGB (left) and Natural Colour RGB (right), 12 January 2017, 09:40 UTC